New Species of North American Torymidae

(Hymenoptera)

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Material representing four undescribed species of Torymidae has recently been made available through the investigations of several entomologists. I am describing them at present to make the names available for biological studies currently underway.

Two of the undescribed species are in the genus *Monodontomerus* Westwood. No species have been described from North America since Gahan (1941) last characterized and revised the genus. Dr. B. D. Burks (United States National Museum, Washington, D. C.) first sent material and suggested I describe a species of *Monodontomerus* reared from the douglas-fir tussock moth, *Hemerocampa pseudotsugata* McDunnough. Another *Monodontomerus*, reared from an anthidiine bee, *Dianthidium heterulkei* Schwarz, was compared for me with U. S. National Museum material by Dr. Burks and determined as new. Two species of *Torymus* Dalman are also described. One has been reared from a cecidomyiid gall, *Walshomyia cupressi* Gagné, on *Cupressus* and the other from a cynipid gall, *Disholcaspis cinerosa* (Bassett), on *Quercus*.

The holotype, allotype, and some paratypes of each new species will be deposited in the United States National Museum. Paratypes will also be placed in the Canadian National Collection, Ottawa, and the Entomology Museum, University of California, Davis. Additional paratype deposition is indicated where needed.

Monodontomerus saltuosus Grissell, new species

FEMALE HOLOTYPE.—(Chromosome number, $2n = 10$). Body length 4.0 mm, ovipositor 1.4 mm. Head, scape, thorax, coxae, and femora dull metallic blue-green to black (when viewed at some angles), abdomen dark blue-green to almost black, flagellum black, tibiae and tarsi burnt orange, mandibles and wing veins dark brown, wings hyaline except brown stain surrounding stigmal vein and extending from postmarginal vein about one-fourth distance to posterior wing margin. Head, thorax, coxae, femora, and gastral terga IV–VI with fine, even reticulations, mesepimeron, median frenal area, and tergum I polished. Areas with thick, appressed pubescence include: head, dorsum of thorax except frenal area, coxae except median areas, femora, and gastral terga III–V laterally; long erect pubescence present at lateral propodeal margins; eyes with erect, conspicuous pubescence. Face as in Fig. 3; ocellocular distance slightly less than lateral ocellus diameter (5:6); antennal funicle cylindrical, segments subquadrate;

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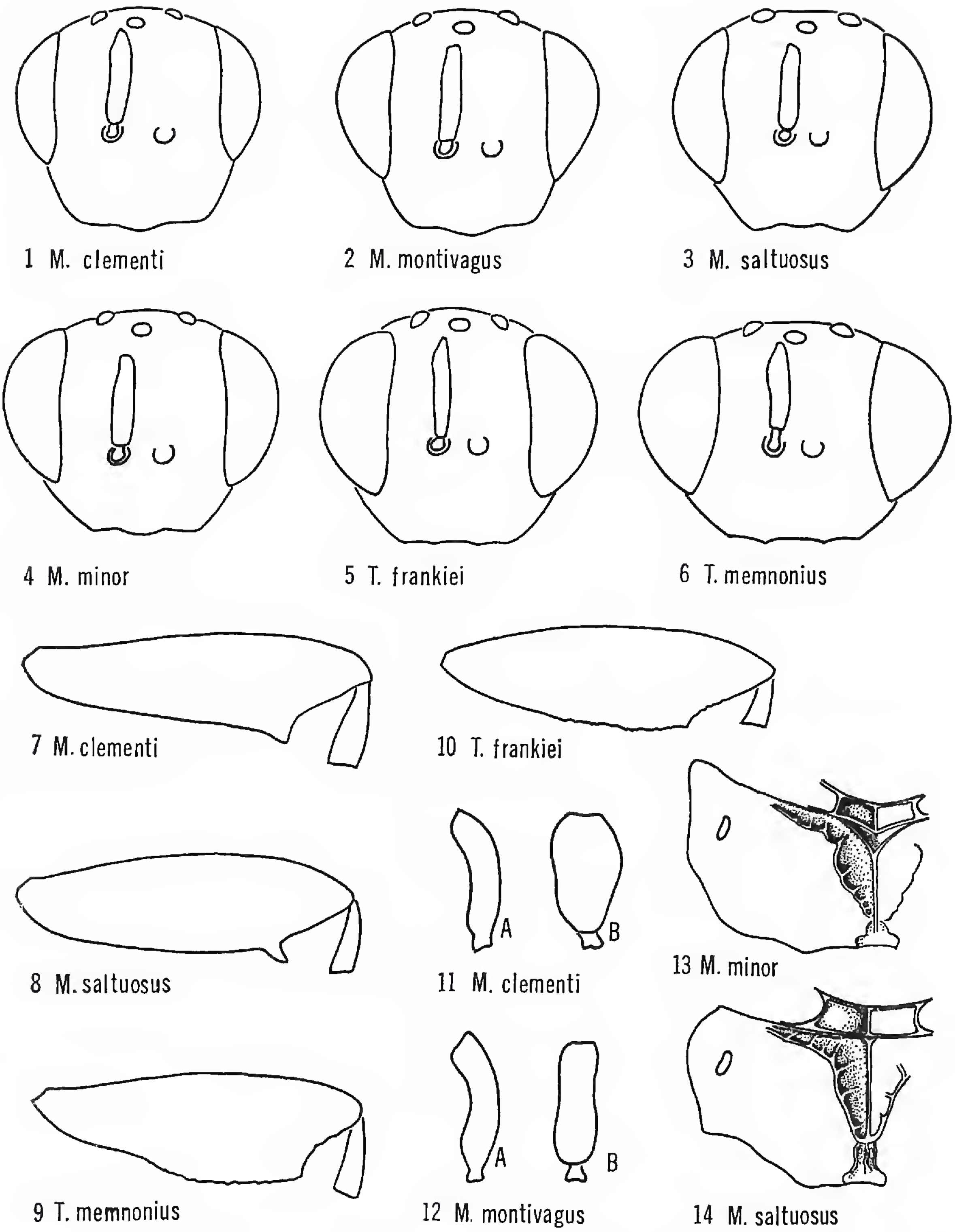
complete malar sulcus present; mandibles tridentate; clypeus slightly protuberant, but not extending to imaginary line connecting lateral corners of oral fossa. Dorsellum of metanotum (Fig. 14) convex with fine, median carina; propodeum with triangular median depression somewhat truncate at posterior fourth, median carina becoming crooked and obscure posteriorly, anteriorly the median carina with obscure fork; forewing with postmarginal vein about one-half as long as marginal; hindfemur with denticle arising abruptly (Fig. 8). Abdomen about as long as head and thorax combined, terga without median posterior emarginations; ovipositor 0.72 times length of abdomen.

MALE ALLOTYPE.—($n = 5$). Length 3.2 mm. Similar to female except antennal toruli slightly lower on face.

Holotype female, IRON MOUNTAIN, 24 MILES EAST OF PLACERVILLE, EL DORADO COUNTY, CALIFORNIA, August 1970, ex *Hemerocampa pseudotsugata*, C. G. Thompson collector; allotype, 3♀, 3♂ paratypes same data; 4♀, 4♂ same data except coll. 3 November 1971 em. January 1972, D. L. Dahlsten collector. Additional paratypes all same host data and county: 43♀, 9♂ Plummer Ridge, 22 mi. SE Placerville, coll. 2 November 1971, em. 10 November to 23 January 1972, D. L. Dahlsten collector; 3♀, 1♂ same data except coll. August 1970. Additional specimens not paratypes: 5♀, 1♂ Sandia Mtns., near Albuquerque, New Mexico, coll. August and November 1959, A. Rivas, Yasinski collectors, same host data as holotype. Paratypes will be placed in the collection of the Division of Biological Control, University of California, Albany as well as those institutions listed in the introduction.

VARIATION.—Females vary in length from 2.5 mm (ovipositor 0.69 times as long as abdomen) to 4.2 mm (ovipositor 0.62 times abdomen). Males range in length from 2.1 to 3.2 mm. In several specimens the scape, fore and midfemora are infused with yellow rather than the normal metallic bluish green color. This may have been the result of killing individuals in a teneral condition. In other respects this species appears to be quite constant.

SYSTEMATICS.—*Monodontomerus saltuosus* will most readily run to *M. subobsoletus* Gahan (= *minor* Ratzeburg) in Gahan's 1941 key to *Monodontomerus*. It agrees with *M. minor* in several respects including coloration, sculpturing, facial proportions (except position of antennal toruli), proportion of wing veins, slender hindfemoral tooth, and relative length of ovipositor. *Monodontomerus saltuosus* differs from *M. minor* in both sexes particularly by the convex dorsellum with a weak median carina in *M. saltuosus* (Fig. 14) as opposed to the deeply concave dorsellum with pronounced median carina of *M. minor* (Fig. 13); *M. minor* also has the propodeal carina markedly forked anteriorly and *M. saltuosus* is not noticeably forked. *Monodontomerus*



FIGS. 1–6. Heads of *Monodontomerus* and *Torymus*, facial view. FIGS. 7–10. Hindfemora, lateral view. FIGS. 11–12. Male scape; A. lateral view; B. ventral view. FIGS. 13–14. Propodea, posterior view.

saltuosus may be separated in addition by the posterior apex of the scutellum which is pitted; the apex is smooth in *M. minor.* A character which works well for females but not males, is the relative position of the antennal toruli. In *M. saltuosus* they are somewhat higher than in *M. minor*, causing the lower face to be proportionately longer in *M. saltuosus* (cf. Figs. 3 and 4).

Monodontomerus clementi Grissell, new species

FEMALE HOLOTYPE.—(2n =12). Body length 3.2 mm, ovipositor 2.6 mm. Head, scape, thorax, coxae, abdomen, and femora except apices, bright metallic blue, flagellum black, tibiae, tarsi, and apices of femora mahogany to burnt orange, mandibles and wing veins dark brown, wings hyaline except slight suggestion of brown stain surrounding stigmal area. Head, dorsum of thorax except frenum, and metapleuron shagreened, mesepisternum and hindcoxa with distinct punctation, femora and propodeum laterally distinctly reticulate, mesepimeron dorsally, frenum, dorsellum, and median propodeum polished, terga I–V polished dorsally but with extremely fine reticulations. Recumbent pubescence on head, dorsum of thorax except frenum, metapleuron, coxae except median areas, femora, terga I and III–VI laterally, longer erect pubescence at lateral margins of propodeum, eyes with inconspicuous erect pubescence. Face as in Fig. 1; ocellocular distance greater than lateral ocellus diameter (12:8) ; antennal funicle cylindrical, segments subquadrate; complete malar sulcus present; mandibles tridentate; clypeus projecting slightly, extending to imaginary line connecting lateral corners of oral fossa. Dorsellum convex with fine median carina which projects slightly posteriorly; propodeum with triangular median depression ending at posterior ⅖, median carina distinct entire length, anteriorly with an almost imperceptible fork; forewing with postmarginal vein about one-half as long as marginal; hindfemur with tooth arising gradually (Fig. 7). Abdomen slightly longer than head and thorax combined, terga without median posterior emarginations; ovipositor about 1.6 times length of abdomen.

MALE ALLOTYPE.—(n = 6). Length 2.7 mm. Similar to female except scape markedly transversely flattened, distally expanded, and bowed slightly lengthwise (Fig. 11), undersurface appearing polished but with fine reticulations, upper surface strongly shagreened.

Holotype female, 1 MILE WEST WEST THUMB, YELLOWSTONE NATIONAL PARK, WYOMING, emerged 30–31 September 1971 ex cell collected 5 September 1971 of *Dianthidium heterulkei heterulkei*, S. L. Clement collector. Allotype male and 6 female paratypes same data as holotype; 2♀, 2♂ paratypes same data but coll. 16–24 July 1971, em. 31 July 1971; 16♀, 7♂ paratypes laboratory reared on *Megachile pacifica* Panzer from original field collected material.

VARIATION.—The primary variation of this species lies in the size of laboratory reared individuals. A size factor of greater than 2 to 1 between largest and smallest specimen resulted from over or undercrowding of the gregarious parasitic larvae on host larvae in gelatin capsules. Field collected individuals (9 females) range in length from 2.4 to 4.5 mm, while their laboratory reared progeny (17 females) range from 2.2 to 5.5 mm. One dwarf specimen has the ovipositor 1.1 times the length of the abdomen. The range for ovipositor lengths of other specimens is 1.5 to 1.8 times the abdominal length. Males range from

2.3 to 3.9 mm. Small specimens tend to have a greater ocellocular: lateral ocellus diameter ratio (15:9) than do larger specimens (13:11).

SYSTEMATICS.—*Monodontomerus clementi* will key to *M. montivagus* Ashmead in Gahan's key (1941) and resembles that species in most respects except for the following. In *M. clementi* the body is blue whereas in *M. montivagus* it is olive green, *M. clementi* (Fig. 1) has the malar space equal to one-half the eye height ($\bar{x} = 0.50$, range 0.44–0.58, $n = 20$) as compared to one-third in *M. montivagus* (Fig. 2) ($\bar{x} = 0.32$, range 0.29–0.35, $n = 20$), *M. clementi* has the scape consistently metallic blue whereas *M. montivagus* has the scape yellow, and *M. clementi* has the ovipositor about equal to the body length as compared to *M. montivagus* which has the ovipositor barely longer than the abdomen. An additional character in the males is the scape of *M. montivagus* which is usually more arcuate in lateral view (Fig. 12A) and less expanded in ventral view (Fig. 12B) as compared with *M. clementi* which is more evenly bowed in lateral view (Fig. 11A) and noticeably expanded in ventral view (Fig. 11B).

I take pleasure in naming this species after Stephen L. Clement, a fellow student of the Hymenoptera.

Torymus frankiei Grissell, new species

FEMALE HOLOTYPE.—Length 3.5 mm, ovipositor 3.8 mm. Head, thorax, coxae, femora, and abdomen metallic green, scape and tibiae yellow-orange infused with varying amounts of metallic green, flagellum black, tarsi pale straw-yellow, wing veins brown. Face and frons completely shagreened, thoracic dorsum except frenum transversely rugose with effaced setigerous punctures, frenum medially transversely rugose, laterally longitudinally rugose, propodeum, terga I–II dorsally and inner face of hindcoxa appearing polished to lightly reticulate, outer face of hindcoxa strongly reticulate. Face as in Fig. 5; ocellocular distance less than lateral ocellus diameter (8:10); antennal funicle cylindrical, pedicel:F1:F2 ratio as 6.5:7:6.5, F1–5 longer than wide, F6–7 subquadrate; frenal groove distinct, frenum one-third length of scutellum; mesepimeron twice as high as wide; propodeum with two submedian foveae subtended mesally by carinae which connect to posterior of propodeum; hindcoxa dorsally smooth, without setae, with dorsal carina extending onto outer coxal face, hindfemur with angulate denticle subapically beneath (Fig. 10); costal cell anteriorly with almost complete setal row beneath, basal vein with setae, cubital vein bare basally, with several setae at intersection of basal vein, area beneath marginal vein distinctly setose, no obvious setal rows radiating from stigma, stigmal vein subsessile. Terga I-IV obviously incised apically; ovipositor 2.1 times length of abdomen.

MALE ALLOTYPE.—Length 2.3 mm. About as in female except as follows: body coppery green, scape dark, pedicel:F1:F2 ratio as 10:12:10.5, F1–3 slightly longer than wide, F4–7 subquadrate. Punctures on thoracic dorsum obscure, indicated by setae; hindfemoral denticle obscure, appearing almost absent.

Holotype female, 2 MILES EAST FT. BRAGG, MENDOCINO COUNTY, CALIFORNIA, emerged 16 April 1968 ex galls collected 1 March 1968 of *Walshomyia cupressi* on *Cupressus pygmaea* (Lemmon) Sargent, G. W. Frankie collector; allotype, 7♀, and 10♂ paratypes with same data except em. 12 March to 18 April 1968. Additional paratypes: 13♀, 19♂ Ft. Bragg, same data as holotype except coll. 6 March to 25 May 1967, em. 8 April to 14 June 1967. Other specimens not paratypes: 9♀, 5♂ Carson Ridge, Marin Co., Calif., coll. 2–10 April em. 22 April to 7 May, ex *Walshomyia cupressi* on *Cupressus sargenti* Jepson. Paratypes of this species will be placed in the Entomology Museum, Texas A & M University, College Station, as well as those institutions mentioned in the introduction.

VARIATION.—Females of *T. frankiei* range in size from 2.5 mm (ovipositor 2.2 times length of abdomen) to 3.5 mm (ovipositor 2.1 times abdomen). Males vary in length from 1.9 to 2.7 mm. Color ranges from entirely coppery green (some males) to partially green and copper to all green (most specimens). In other respects this species appears quite stable in characters which typically tend to vary in *Torymus* such as relative funicular lengths and ocelli ratios.

SYSTEMATICS.—*Torymus frankiei* clearly belongs to a group of species characterized by *T. fullawayi* (Huber) by reason of its rugose thorax, the frenum differently sculptured than the rest of the scutellum, the large propodeal foveae, and the denticulate hindfemur. It is nearest to *T. denticulatus* (Breland) in lacking the median propodeal carina but differs from that species in having a setose costal cell and the hindcoxa dorsally smooth with the carina extending onto the outer coxal face. In *T. denticulatus* the costal cell is almost bare and the coxa has a completely dorsal carina.

This species is named for Dr. Gordon W. Frankie in recognition of his work with *Torymus*.

Torymus memnonius Grissell, new species

FEMALE HOLOTYPE.—Length 4.4 mm, ovipositor 4.1 mm. Head, coxae, femora, and abdomen black, scape orange, fore and midfemora smoky, hindfemur orange infused with black, tarsi white tinged orange, wing veins brownish white, stigma and parastigma dark brown. Face and frons shagreened, thoracic dorsum, dorsellum, propodeum, hindfemur, and hindcoxa evenly reticulate (size of reticulation varying somewhat with location), abdomen evenly punctate but appearing reticulate except tergum I polished dorsally. Face as in Fig. 6; ocellocular distance equal to lateral ocellus (6:6); antennal funicle cylindrical, pedicel:F1:F2 ratio as 7:10:10, F1–5 longer than broad, F6–7 subquadrate. Frenal groove absent (or seen at lateral margin only), frenum indicated by slightly smaller reticulation than anterior of scutellum and by absence of setae; mesepimeron 2.3 times as high as wide, slightly narrowed dorsally; propodeum with large pits one-fifth length of propodeum along anterior margin, two weak submedian carinae one-half length of propodeum on posterior margin, spiracle 1.5 times own long diameter from posterior margin; hindcoxa dorsally weakly carinate and without setae, hindfemur greatly expanded distally and with obvious denticulate angle beneath (Fig. 9); costal cell bare except anteriorly beneath with proximal row one-fifth length of cell and distal row both above and beneath one-third cell length, cubital vein without setae basally, basal vein setose, area beneath marginal vein setose for distal two-thirds, one obscure setal row radiating from stigma distally; stigmal vein sessile. Terga I–IV obviously incised apically, laterally with numerous long recumbent setae; ovipositor 2.0 times length of abdomen.

MALE ALLOTYPE.—Length 3.1 mm. About as in female except body black with bluish tinge, scape and tibiae bluish black. Pedicel:F1:F2 ratio 6:8:8, all segments at least slightly longer than wide. Propodeum with anterior median carina one-half length of propodeum, posterior submedian carina one-third length of propodeum.

Holotype female, H. F. HEEP FARM, 11 MILES SOUTH AUSTIN, TRAVIS COUNTY, TEXAS, emerged 1 July 1971 ex galls collected 21 May 1971 of *Disholcaspis cinerosa* on *Quercus virginiana* Miller, G. W. Frankie collector; allotype, 23♀, 20♂ same data as holotype except numerous collection and emergence dates. Additional paratypes: 7♀, 6♂ Texas A & M University, College Station, Brazos Co., Texas, same host data as holotype, various collection and emergence dates. Paratypes of this species will be placed in the Entomology Museum, Texas A & M University as well as those institutions listed in the introduction.

VARIATION.—Size range in females is 3.6 mm (ovipositor 3.0 times length of abdomen) to 4.6 mm (ovipositor 2.7 times abdomen). The ovipositor ranges from 2.0 to 3.0 times as long as the abdomen. Males range from 2.1 to 3.1 mm. In some specimens of both sexes the black body color may be tinged with blue or green. The propodeal carinae of both sexes vary from absent to weakly developed. No specimens have complete carinae.

SYSTEMATICS.—*Torymus memnonius* is very similar to *T. melanocerae* (Ashmead) but differs in having the hindfemur expanded and angulate beneath (slightly bulged in *T. melanocerae* but not angulate), in lacking the frenal groove (distinct in *T. melanocerae*), and in having the body and femora black (*T. melanocerae* is blue to blue-green).

ACKNOWLEDGMENTS

I wish to express my appreciation to Dr. B. D. Burks for the loan of specimens and for suggestions concerning the systematic placement of the 2 new *Monodontomerus*. In addition Dr. D. L. Dahlsten (University

of California, Gill Tract, Albany, California), Dr. G. W. Frankie (Texas A & M University, College Station, Texas), and Mr. S. L. Clement (University of California, Davis, California) have contributed reared specimens for this study. Mr. C. Goodpasture (University of California, Davis) has determined the karotype number of the two *Monodontomerus* in connection with his research. In addition he has offered constructive criticism of this manuscript. I am indebted to these gentlemen.

LITERATURE CITED

GAHAN, A. B. 1941. A revision of the chalcid-flies of the genus *Monodontomerus* in the United States National Museum. Proc. U. S. Nat. Mus., 90: 461–482.

BOOK REVIEW

ANNUAL REVIEW OF ECOLOGY AND SYSTEMATICS. VOLUME 2. Edited by R. F. Johnston. Annual Reviews Inc., Palo Alto, California. 510 p., 60 figs., 11 tables. 1971. $10.00.

This volume contains 19 articles by 21 contributors with the majority of articles devoted to aspects of ecology and only three relating to systematics.

For the entomologist with varied interests many articles will have general appeal. Only the article by R. van den Bosch on biological control is devoted exclusively to insects. The article by D. H. Janzen considers the ecological processes of seed predation by insects and other animals with special emphasis on the chemical aspects of host specificity. The colonization of small bodies of water held by leaves, flowers, or tree holes (= phytolemata) by organisms (ranging from bacteria to insects and even a few frog tadpoles), and community structure in this microhabitat are discussed by B. Maguire, Jr. The role of animals including insects in the breakdown of litter receives some attention from M. Witkamp in his article on soils as ecosystem components. The article on laboratory stream research by C. E. Warren and G. E. Davis, although not dealing specifically with insects, presents a valuable discussion of the application of studies in these closed or partly closed systems in relation to natural ecosystems. Feeding strategies are discussed in two articles: the theoretical aspects and models are treated by T. W. Schoener; while D. H. Morse contrasts the adaptive strategies among insectivorous birds.

Two of the three systematic articles deal with phenetics while the third discusses karyotypes. The relationship between character sets in the subject of the article by J. S. Farris. Classificatory strategies and group measures in the cluster concept are discussed by W. T. Williams. The value of the karyotype in systematics is increasing as techniques are developed to detect new ways in which karyotypes differ and this topic is reviewed by R. C. Jackson.

This collection of review articles contains something of value for a wide audience interested in ecology and systematics.—ROBBIN W. THORP, *University of California, Davis, 95616.*